

Abstract

An abrasive composite material containing a matrix, abrasive grains, and carbon fiber having a multi-layer structure, each fiber filament of the carbon fiber having an outer diameter of about 2 to about 500 nm and an aspect ratio of about 5 to about 15,000, and including a hollow space extending along its center axis. Preferably, the carbon fiber has a BET specific surface area of about 4 m²/g or more; the carbon fiber has, at a carbon (002) plane, an interlayer distance (d_{002}) of about 0.345 nm or less as measured by means of X-ray diffractometry; and the ratio of the peak height (Id) of the band at 1,341 to 1,349 cm⁻¹ in a Raman scattering spectrum of the carbon fiber to the peak height (Ig) of the band at 1,570 to 1,578 cm⁻¹ in the spectrum; i.e., Id/Ig, is about 1.5 or less. More preferably, the carbon fiber contains branched vapor grown carbon fiber; boron is contained, in an amount of about 0.01 to about 5 mass%, in the interior of crystals constituting the carbon fiber; and the amount of the carbon fiber contained in the abrasive composite material is about 2 to about 40 vol.%. When the abrasive composite material is employed, high-precision grinding or polishing can be attained. When the composite material is employed in a cutting tool material, the resultant cutting tool material realizes high-speed, high-efficiency cutting, and enables wire-cut electrical discharge machining.